

some typographical errors in the specification. No new matter is added by the amendments to the specification.

This application is related by copendency to earlier filed Application Serial Nos. 2,089; 6,991 and 12,205. An Office Action has been received on each of the earlier filed applications. To simplify prosecution Applicant intends to abandon Application Serial Nos. 2,089 and 6,991, but not the inventions thereof, in favor of Serial No. 12,205 and the instant application. This intention was brought to the Examiner's attention during an interview conducted December 2, 1987. As will be explained below, certain of the claims of Serial Nos. 2,0879; 6,991 and 12,205 are, by this Preliminary Amendment, being presented for further prosecution in the instant application. Other claims from Serial Nos. 2,089 and 6,991 will be presented by amendment in Serial No. 12,205 for further prosecution. During the interview conducted December 2, 1987, Applicant was advised that a Supplemental Office Action will shortly be issued in Serial No. 12,205 and that the period for response in that application will be restarted. To avoid any confusion that may be occasioned in Serial No. 12,205 by filing an amendment in that case which would cross with the Supplemental Office Action to be issued, Applicant will await receipt of the Supplemental Office Action before filing any response presenting amended or new claims in Serial No. 12,205. It is believed that a clear line of distinction will be maintained between the claims now presented in the instant application and those to be presented in Serial No. 12,205.

For convenience, all claims of this application have been canceled without prejudice so that the new claims presented by amendment may be grouped together according to the type of subject matter claimed. In essence, claims 2-9 originally presented in this application are now new claims 56-65; claims 10-15 originally presented in this application are now new claims 82-87.

The newly presented claims are as follows:

Claims 16-34: Method for using a defined oxide complex as a superconducting material.

- Claim 16, independent, broadest oxide complex formula, but excludes a LaBa oxide species of Bednorz, et al, Z. Phys. B., 64, pp. 189-193 (1986) [hereafter "Bednorz"].

- Claim 20, independent, the "x" value of the oxide formula excludes coverage of a Bednorz LaBa oxide formulation.

- Claim 29, independent, the "x" value of the formula excludes a Bednorz LaBa oxide.

Claims 35-65:, Composition claims for a composition which is superconducting at a temperature greater than 40°K.

- Claim 35, independent, empirical formula can cover a Bednorz oxide, but claimed composition is of a different microstructure than a Bednorz oxide.

- Claim 47, independent, stated empirical formula excludes a LaBa oxide species of Bednorz.

- Claim 56, independent, stated empirical formula has an "x" value that excludes a Bednorz oxide species.

Claims 66-87: Composition by Process Claims

- Claim 66, independent, empirical formula 7 may cover a Bednorz oxide, but claimed product is produced by a process different from Bednorz.

- Claim 78, independent, empirical formula may cover Bednorz oxide, but claimed product is produced by a different process.

- Claim 82, independent, empirical formula may cover a Bednorz oxide, but claimed product is made by a different process.

Claims 88-91 Method of making claims.

To the extent that a claim added to this application by this Preliminary Amendment is based upon or related to a claim in Serial Nos. 2,089; 6,991 or 12,205 that was objected to or rejected on a prior art basis, the objection/rejection will be addressed by this Preliminary Amendment. For that reason, the following tabulation is presented regarding the antecedent basis for the claims now presented.

<u>Claim No.</u>	<u>SN 2,089</u>	<u>SN 6,991</u>	<u>SN 12,205</u>	<u>SN 32,041</u>
16				1
17-19	3-5			
20				1 & 2
21-28				2-9
29		28		
30-34		29-33		
<hr/>				
35	3			
36-39	4-8			
40-42	Disclosure			
43-46	Disclosure			
47				1
48-49				2-3
50-52		1 & 13, 28, 32 & 33		
53-55	3-5			
56				1 & 2
57-65				2-9

<u>Claim No.</u>	<u>SN 2,089</u>	<u>SN 6,991</u>	<u>SN 12,205</u>	<u>SN 32,041</u>
66		13 & 14 & 15		
67-71		16-20		
72-77		22-27		
78			5	
79-81			6-8	
82				10
83-87				11-15
<hr/>				
88			1	Disclosure
89-92			2-4	

Claims 16-34: Method of Use

Claims in terms of a method for using a defined oxide composition as a superconductor have not before been presented in this application or its antecedent applications. Each of the antecedent applications and this application describe the defined oxide compositions as superconducting materials, so the instant method claims are fully supported.

In the Office Actions issued in the antecedent applications the Examiner took a position with respect to various oxide composition claims that certain prior art references disclosed overlapping compositions and, although the references did not suggest or disclose that the overlapping compositions possessed superconducting properties, it was the Examiner's position that superconducting properties were inherent in the compositions disclosed by the applied references. That point will be addressed with respect to composition claims to be discussed hereafter. However, it is believed that the Examiner's stated inherency argument for rejection of composition claims is not applicable with respect to the method of use claims now presented as claims 16-34.

Under 35 U.S.C. § 100 the discovery of a new use of a known material is a "process" and may be patented as such, provided of course that the claimed process meets all other requirements for patentability. Therefore, with regard to claims 16-34, the question is whether the claimed process is new and nonobvious and not whether the material used in the claimed process is or is not a known material having as an inherent property the property of superconductivity.

With respect to the reference cited and applied as a basis for rejection of claims in any of the antecedent applications --- namely, Bednorz et al, Z. Phys. B., 64, pp. 189-193 (1986); Kock U.S. Pat. 4,645,622; Beyerlein (I) U.S. Pat. 4,482,644; Beyerlein (II) U.S. Pat. 4,503,166; Gopalakrishnan et al, J. Solid State Chemistry, 22, pp. 145-149 (1977); Komatu U.S. Pat. 4,045,375; Murata U.S. Pat. 4,357,426; and Michel et al, Mat. Res. Bull., 20, pp. 667-671 (1985) --- only the Bednorz reference speaks to an oxide material as possibly being superconductive. Accordingly, the other references are not pertinent to the patentability of claims 16-34 since they neither disclose nor suggest the use of their oxide materials as a superconductive material.

The Bednorz reference speaks only to a very limited oxide material, namely one which, translated to the format of the empirical formula presented in claims 16-34, would be as follows:  $[La_{1-x}Ba_x]_aCuO_y$  wherein for the Bednorz composition "a" = 1, "x" is 0.075 or 0.20 and "y" is from 2 to 4.

Claim 16 and claims 17-19 dependent thereon do not cover the use of a Bednorz oxide composition since claim 16 provides that when "L" is lanthanum "M" is not barium.

Claim 20 and claims 21-28 dependent thereon do not cover the use of a Bednorz composition since "x" is from about 0.65 to about 0.80.

Claim 29 and claims 30-34 dependent thereon do not cover the use of a Bednorz composition since "x" is from about 0.01 to about 0.03.

For reasons above explained, it is submitted that the only reference of any pertinence to claims 16-34 is Bednorz; that the Bednorz composition is not within the coverage of claims 16-34; and therefore claims 16-34 are in condition for allowance.

Claims 35-65: Composition Claims

Insofar as composition or composition by process claims have been presented in this application which relate to composition and/or composition by process claims which were rejected in Serial Nos. 2,089; 6,991 or 12,205, the following tabulation is presented to show the relationship.

Reference Cited-Basis of Rejection (¶ of Office Action)	(a) Serial No. <u>2,089</u>	(b) Serial No. <u>6,991</u>	(c) Serial No. <u>12,205</u>	Related Present Claims
I. Bednorz-102(a)/103				
(a) ¶12	3-5,7-8			35-39
(b) ¶8 ¶8		1 & 13 13-20, 22-23,27		50 60-73,77
(c) ¶8			5	78

Reference Cited-Basis of Rejection (¶ of Office Action)	(a) Serial No. <u>2,089</u>	(b) Serial No. <u>6,991</u>	(c) Serial No. <u>12,205</u>	Related Present Claims
II. Beyerlein I & II 102(b)/103				
(a) ¶14	3			35,53
III. Gopolkerishnan 102(b)/103				
(a) ¶15	7			38
IV. Komatu-102(b)/103				
(a) ¶17	4,7-8			36,38-39
(b) ¶10		13,33		50,52
(b) ¶10		13-20, 22-27		66-77
V. Murata-102(b)/103				
(a) ¶18	3-5,7-8			35-39
(b) ¶11 ¶11		13,33 13-20, 22-27		50-52 66-77
VI. Michel-102(b)/103				
(a) ¶19	7,8			38,39
(c) ¶9			5	78
VII. Michel or Michel v. Bednorz 102(b)/103				
(b) ¶9		1,13,28, 32,33		50-52
¶9		13,15-20, 22-23		66-73
VIII. Bednorz v. Michael & Murata 103				
(c) ¶10			5-8	78-81
IX. Bednorz v. Komatu & Murata				
(b) ¶12		1,13,28, 32,33		50-52
¶12		13,20,22-27		66-77

Bednorz

With regards to the composition of the Bednorz reference, each of the composition claims 35-65 distinguish over the Bednorz composition either by (1) specifying that the claimed composition, although certain species therein covered may assume the same empirical formula as the Bednorz oxide, has a different microstructure -- claim 35, and claims 36-46 dependent thereon; (2) providing that when "L" is lanthanum "M" is not barium -- claim 47 and claims 48-55 dependent thereon; or (3) defining the "x" value of the empirical formula to be of a range that does not cover a Bednorz composition -- claim 56 and claims 57-65 dependent thereon.

With respect to claims 35, the antecedent basis for which is claim 3 of Serial No. 2,089, and the 35 U.S.C. § 112 objection/rejection stated against the antecedent claim, it is believed that claim 35 is now free from the basis on which such objection/rejection was stated. See paragraph 5 of the Office Action of 9/4/87 in Serial No. 2,089, paper no. 8. As now recited in claim 35, the reference point, against which one would determine whether "the interatomic distances between the elements of (a) metal oxide complex are reduced" and therefore covered by the claim is "an oxide complex under atmospheric pressure comprising  $[La_{1-x}Ba_x]_aCuO_y$ ."

It is submitted that the reference point is now clearly defined. It is also submitted that a La-Ba-Cu-O oxide complex of exact empirical formula as a Bednorz oxide is a different composition from the Bednorz oxide when that oxide complex is treated or produced in a manner

to cause it to have interatomic distances that are reduced in any degree compared to a Bednorz oxide. Bednorz does not describe or suggest that its oxide composition be physically subjected to application and maintenance of pressure, cladded, deposited on a substrate of smaller lattice parameter, chemically modified to substitute elements of smaller atomic radii in whole or part for lanthanum or for barium, or otherwise treated for purposes of obtaining a reduction in the interatomic distances between the elements comprising the oxide. It was applicant's discovery that such physical treatments and/or chemical production methods produce an oxide complex of enhanced superconductive properties. The enhancement stems from the reduction obtained in the interatomic distances between the oxide elements. A composition having such reduced interatomic distances is nonobviously different from a Bednorz oxide composition with respect to its properties, hence is a different composition than a Bednorz oxide composition.

Although the claims do not recite a specific degree of reduction obtained, they do nevertheless recite a specific microstructural difference between the claimed composition and the Bednorz composition. It is submitted that claim 35 particularly points out and distinctly claims this compositional difference over a Bednorz oxide and that one of ordinary skill would be able to determine what is without and within the scope of the claim based upon the standard stated.

Composition claim 47, and claims 48-55 dependent thereon do not permit "L" to be lanthanum when "M" is

barium, hence exclude a Bednorz oxide composition. Composition claim 56, and claims 57-65 dependent thereon, by reason of their stated "x" value exclude a the Bednorz oxide composition.

All composition claims 36-65 distinguish over Bednorz for reasons above discussed. There remains for consideration the applicability of one or more of the other references cited as a basis for claim rejections in the Office Actions issued in the antecedent applications.

#### Michel

On the same basis that claims 35-65 distinguish over a Bednorz oxide composition they also distinguish over any oxide composition disclosed in Michel. Michel prepared a  $\text{BaLa}_4\text{Cu}_5\text{O}_{13.4}$  oxide to study its behavior in comparison to a  $\text{La}_3\text{Ba}_3\text{CuO}_{16.8}$  oxide previously reported. Converted to the empirical formula format of the claims, the Michel prepared oxide corresponds to  $[\text{La}_{1-x}\text{Ba}_x]_a\text{CuO}_y$  wherein "x" = 0.2, "a" = 1, and y = 2.68. The previously reported oxide, converted to the empirical format of the claims corresponds to  $[\text{La}_{1-x}\text{Ba}_x]_a\text{CuO}_y$  wherein "x" = 0.5, "a" = 1 and "y" =  $2.33 + 3/6$ .

Claims 35-46 distinguish over Michel by specifying a different oxide microstructure; claims 47-55 distinguish by providing that when "L" is lanthanum "M" is not barium; and claims 56-65 distinguish by defining an "x" value range that excludes the Michel oxide composition.

#### Beyerlein I & II

Beyerlein (I) discloses a class of oxygen-deficient barium containing compounds which are useful as a catalyst for the oxidative dehydrogenation of acyclic olefins to

aromatic products or dimers. The Examiner directed attention particularly to examples 5 and 9 of Beyerlien I as disclosing oxide compounds overlapping those claimed by claim 3 of Serial No. 2,089, now claims 35 and 53 of the instant application. It is respectfully submitted that there is no such overlap. Specifically, example 5 of Beyerlein I discloses the compound  $Ba_2La_{0.5}Bi_{1.5}O_{5+y}$  and example 9 the compound  $Ba_2La_{0.67}Bi_{1.33}O_{5+y}$ . Converted to the empirical formula presentation of the claims wherein "L" = La, "M" = Ba, "A" = Bi the Beyerlien I's example 5 compound would have values as follows, "a" = 1, "x" = 1.33, "y" = 3.33-4.0 and the example 9 compound would have values of "a" = 2.004, "x" = 0.75, "y" = 3.75-4.5. Neither the example 5 nor the example 9 compounds of Beyerlien I are within the "a", "x" and "y" values set forth by the claims.

Beyerlein II discloses a Ba-La-Bi oxide for use as a catalyst for the selective production of aromatic compounds from acyclic olefins. The Examiner directed attention to examples 1, 2, 3 when rejecting claim 3 of Serial No. 2,089, now claims 35 and 53. Again, with regards to the "a", "x" and "y" values set forth by claims 35 and 53 there is no overlap possible to a Beyerlien II compound of examples 1-3. Converted to the empirical formula presentation of the claims the Beyerlien II example compounds have the following "x", "a" and "y" values:

<u>Example</u>	<u>a</u>	<u>x</u>	<u>y</u>
1	1	1.33	3.33-4.0
2	1.2857	.8889	2.857-3.428
3	2.004	.75	3.75-4.5

Gopalakrishnan

Gopalakrishnan reports on a composition comprising  $\text{La}_{2-x}\text{Sr}_x\text{NiO}_4$  wherein "x" is from 0 to 1. Gopalakrishnan was cited in the rejection of claim 7 of Serial No. 2,089, now claim 38. Since the Gopalakrishnan composition has Ni as an element wherein in the compositions claimed the element "A" is not defined to include Ni, there is no overlap.

Insofar as Beyerlein I, Beyerlein II or Gopalakrishnan have been asserted against an antecedent claim as disclosing and overlapping empirical composition, based upon the above remarks, it is submitted that there is no empirical overlap with respect to any of present claims 35-65. No overlap is possible with respect to the "x" "a" and "y" values stated in independent claims 35 and 56. Independent claim 47 excludes any overlap by providing that when "L" is lanthanum "M" is not barium. Since there is no empirical formula overlap possible as to these references, it is believed to be unnecessary to discuss the Examiner's "inherency" theory for rejection over these references.

Komatu

Komatu was applied as a basis for rejection of claims 4, 7, 8 of Serial No. 2,089 (Office Action ¶ 17) now claims 36, 38, 39; and claims 13-27 of Serial No. 6,991 (Office Action ¶ 10) now claims 50, 52 and 66-77.

With respect to claims 36, 38 and 39, each dependent back to independent claim 35, it is submitted that Komatu is not applicable as a basis for rejection. Specifically, each of claims 36, 38 and 39 define the "L", "M" and "A"

components to be a single defined element. Komatu positively requires its oxide composition to be a mixed element oxide with respect to the "A" element of the empirical formula of the claims. Thus, with respect to claims 36, 38 and 39 wherein each of the "L" and the "A" constituents are defined to be a single element, no empirical compositional overlap is possible with Komatu.

With respect to claim 47, and claims 48-55 dependent thereon, the defined "L" element does not include scandium as a permissible "L" and the defined "A" is not permitted to be a combination of elements. Given these constraints on the claimed composition, empirical formula overlap with a Komatu mixed element oxide composition is not possible. Empirical formula overlap with a Komatu composition would only be possible if, as to the claimed composition the "L" component could be a mixture of scandium with another defined "L" element, or if the "M" component were permitted to be a paired combination of Cu:V, Cu:Ti, Cu:Zr, V:Ti, V:Zr, or Ti:Zr. In one case -- that is where the "M" component is permitted to be a paired combination -- at the claimed value of "a" = 1, "y" = 3, and  $0 < x < 1$  empirical overlap with Komatu would be possible at Komatu's formula values of  $0 < X < 1$  and  $0 < Y < 1$ . In the second case -- that is, where scandium is permitted to be paired with another "L" element empirical overlap with Komatus would be possible at the values of "a" = 1.666, "y" = 4, "x" = 0.01 to 0.799206 for Komatu's formula values of Y = 0.25 and X = 0.012499 to 0.999; or at the values of "a" = 1.0202, "y" = 3.03, "x" = 0.01 to 0.9802077 for Komatu's formula value of Y = 0.01, X = 0.0100999 to 0.999.

However, for reasons explained claims 47-55 exclude the possibility of such empirical formula overlap with Komatu.

With respect to independent claim 56, and claims 57-65 dependent thereon, the "a" value of the formula is defined as "a" = 1. As above explained the minimum "a" value at which any possibility of empirical overlap with Komatu begins in the case of the "L" element being scandium paired with another L element, is at  $a = 1.020$ . Claim 56 does not permit the "A" component to be mixed with a pair of A elements. Thus claims 56-65 exclude the possibility of empirical formula overlap with any mixed element oxide composition disclosed by Komatu.

Murata

With respect to the composition claims, Murata was cited as a basis for rejection of claim 3-5, 7, 8 of Serial No. 2,089 (Office Action ¶ 18), now claims 35-39; and of claims 13-27 of Serial No. 6,991 (Office Action ¶ 11), now claims 66-77. In this respect it should be noted that independent composition claims 35, 47 and 56 each claim as the composition "a sintered oxide complex..." of a defined empirical formula. Murata on the other hand, does not teach or disclose as a composition a "semiconductive compound oxide" which is both sintered and overlapping in empirical formula to those claimed in this application. Note that the closest Murata comes to producing as a separate and distinct "semiconductive oxide composition" is to make a calcined material of the appropriate amounts of oxides and/or carbonates necessary to ultimately yield a semiconductive compound oxide of formula  $A_{1-x}A'_xBa_{3-3x}$ . But Murata does not produce the

$A_{1-x}A'_xBa_{3-2}$  as a separate and distinct sintered composition. Instead, Murata mixed the calcined precursor material with a calcined precursor material of its "compound oxide",  $AMo_3$ , before sintering the combined material. In each example of Murata this material is referred to as a "presintered powder" of the semiconductive compound oxide which is obtained by calcining a mixture of the raw materials at  $1,100^{\circ}C$ . The only material produced in sintered form is the final ceramic which is a mixture of the presintered powders of the semiconductive oxide compound and the oxide compound.

Calcining forms oxides from the oxide/carbonate raw materials by expelling the volatile portions therefrom. But it is the sintering of the calcined materials that produces the coalescences of the crystalline or amorphous particles of the calcined materials into a solid mass by forming allotropic crystals therefrom. Hence, it is clear from the face of Murata that Murata does not form a composition as here claimed. At best, Murata may have formed a precursor material which by empirical formula alone may overlap with the compositions here claimed, but Murata did not make a sintered composition as here claimed. From Murata's description of the semiconductive compound oxide as being a "presintered powder" the inference to be drawn is that a coalescences of the crystalline or amorphous particles of the calcined raw materials into a solid mass by forming allotropic crystals has not occurred. From Murata's description the formation of allotropic crystals would only be expected to occur

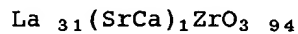
after the presintered semiconductive compound oxide is mixed with the compound oxide.

Although Murata "B" element of the semiconductive oxide could hypothetically be Cu or V (Chu's "A") Murata, by express disclosure and by example illustrates a preference for "B" to be Mn (Chu "M"), Co, or Ni.

Hence by reason of Murata's express preference and examples illustrated, a final Murata composition having the required "A" element would not result until an admixture of Murata's preferred semiconductive oxide compound was made with an oxide compound of Murata which contained Ti or Zr. Even then, the resulting ceramic composition would contain elements that are not within the compositions claimed in this application. For instance, with regards to Murata's preferred and illustrated semiconductive oxide formulation, three of the four include cobalt as an element and the fourth includes manganese. Neither cobalt nor manganese is an element allowed in the compositions here claimed. Then to supply the "A" element of the claimed composition the Murata semiconductive oxide formula, together with its undesired Co or Mn content, would have to be mixed with a compound oxide containing either Ti or Zr. The preferred Ti or Zr containing compound oxides of Murata, by express disclosure and examples, are  $\text{SrTiO}_3$ ,  $\text{BaTiO}_3$  or  $\text{Sr}_{1-y}\text{Ca}_y\text{TiO}_3$ ,  $\text{MgTiO}_3$ , and  $\text{CaZrO}_3$ . Although Murata generally indicates that the semiconductive compound oxide may be admixed with the compound oxide in ratios of 1:100 to 100:1, the preferred range stated is 1:50 to 1:1 and Murata's examples illustrate a mixture at no higher ratio

than 1:2.33 (Table 2, No. 2-2). Hence one is presented with the proposition that to obtain from the teachings of Murata a sintered composition having within it components which will match to the "L", "M", and "A" elements of the composition here claimed, one must tolerate or ignore the presence of additional non "L", "M", or "A" components within the Murata composition. Even ignoring such non "L", "M", and "A" elements it is believed that the resulting Murata composition as to the "L", "M", and "A" do not overlap with any composition here claimed.

For instance, examining Specimen No. 2-2 of Table 2 of Murata wherein the "L" component is La, "M" is a combination of Sr and Ca and "A" is Zr (and ignoring Co as an undesired inclusion) the resulting sintered composition is as follows:



for which "a" = 1.31, "x" = 0.76 and "y" = 3.94. With such "a", "x" and "y" values, the No. 2-2 specimen of Murata can only relate to claim 47 and claims dependent thereon. In claim 47 the defined "M" element does not include either Ti or Zr.

#### Combination References

Last, certain antecedent claims to the present series of composition claims 35-65 were rejected over a combination of references, namely claims 1, 13, 28, 32, and 33 of Serial No. 6,991, now claims 50-52, were rejected over Michel in view of Bednorz, or Bednorz in view of Komatu and Murata (§§ 9 and 12 of Office Action in Serial No. 6,991). For reasons already explained in connection with the discussion of the individual

references, it is submitted that there is no empirical formula overlap between the composition claimed and any reference individually or in combination.

Claims 66-87: Composition by Process

Independent claim 66 claims a metal oxide composition of defined empirical formula as produced by a defined calcining then sintering process. Independent claims 78 and 82 claim a metal oxide composition of defined empirical formula as produced by a defined compacting then sintering process.

With respect to claims 13, 14 and 15 of Serial No. 6,991 which are antecedent to present claim 66, Bednorz, Komatu, Murata and Michel were individually cited as a basis for rejection and Michel in view of Bednorz, and Bednorz in view of Michel and Murata, were cited as a combined reference basis for rejection (See ¶¶ 8, 9, 19, 11 and 12 of Office Action in Serial No. 6,991).

Bednorz

Bednorz reports on a  $\text{Ba}_x\text{La}_{5-x}\text{Cu}_5\text{O}_6(3-y)$  sample, where "x" = 0.75 and 1.0 and "y" > 0, which was prepared by coprecipitation of Ba-, La- and Cu-nitrates in an aqueous solution of oxalic acid to form an intimate mixture of the corresponding oxalates. The oxalate precipitate mixture was heated at 900°C for 5 hours, pressed to pellets at 4 Kbar and reheated to 900° C for sintering to yield the resulting samples.

Bednorz studied the low-temperature resistivity of such samples, as prepared by the coprecipitation method

(Figs. 1 and 3) and as a function of annealing conditions, i.e. temperature and  $O_2$  partial pressure (Fig. 2).

The Bednorz authors interpreted their observations to mean they observed the "onset of superconductivity of percolative nature". The sample with best behavior was apparently the  $X(Ba) = 0.75$  annealed at  $900^\circ C$  for 1 hour at  $O_2$  partial pressure of  $0.2 \times 10^{-4}$  bar which exhibited onset around  $35^\circ K$  and bulk superconductivity below  $13^\circ K$ . Annealing to about a temperature of  $950^\circ C$  destroyed the highly conducting phase.

The Bednorz authors reported that to obtain samples exhibiting the new behavior, "The way the samples have been prepared seems to be of crucial importance:....Thus, the preparation from the oxalates and annealing below  $950^\circ C$  are necessary to obtain a non-perovskite-type phase with a limited temperature range of stability exhibiting this new behavior. The formation of this phase at comparatively low temperatures is favored by the intimate mixture of the components and the high reactivity of the oxalates owing to the evolution of large amounts of  $H_2O$  and  $CO_2$  during decomposition."

Bednorz directs away from a superconductive metal oxide composition produced by the solid state calcination-sintering process recited by claim 66 and claims dependent thereon. Specifically, Bednorz teaches that to obtain "this new behavior" (possible superconductivity) it is necessary to produce the identified La-Ba-Cu oxide as a "preparation from the oxalates and annealing below  $950^\circ C$ ...." In view of this express teaching by Bednorz, it is submitted that Bednorz

neither anticipates nor renders obvious the subject matter of claim 66, nor claims dependent thereon.

Komatu

Komatu provides little disclosure concerning the details of the process by which it prepares its mixed oxide materials. It is to be noted that Komatu's concern was to prepare an oxide material which, when used at a high temperature close to the melting point of the material constituents would not undergo evaporate losses of the constituents. Hence Komatu, in speaking of its oxide material notes that it may be prepared by burning the starting oxides or salts such as carbonates, oxalates or acetates at 1400-1900°C for 1 to 10 hours, preferably under pressing, following which the material is ground, molded then sintered. Komatu's examples show that the materials are then heat treated at 1500-1800°C for 200 hours. To Komatu the processing temperatures were of no consequence to the properties of the oxide composition prepared. Yet as Bednorz suggests, and as this application discloses, superconductive properties are lost or degraded where the oxide complex is prepared at excessive processing temperatures. The processing temperatures taught by Komatu clearly exceed any permitted by the terms of claim 66. There is nothing in the Komatu reference which discloses an oxide composition produced in accordance with a process as set forth by claim 66.

Murata

As previously noted, Murata does not produce a sintered semiconductive oxide compound as a separate composition. Instead Murata produces a calcined precursor

of its semiconductive oxide compound, a calcined precursor of its oxide compound, mixes the two and sinters the mixture at a temperature range of 800-1400°C. The only possibility of empirical formula overlap between Murata's sintered mixture of its semiconductive oxide compound precursor and oxide compound precursor with a composition claimed by claim 66 would be if in the empirical formula claimed in claim 66 the "A" element could be a mixture of Ti with another "A" element. Claim 66 does not identify Ti as a possible "A" element. Hence the possibility of empirical formula overlap with a Murata sintered composition is excluded. Thus Murata neither anticipates nor renders obvious the composition by process claimed by claim 66 or claims dependent thereon.

Michel

Composition by process claim 66 does not empirically overlap with any oxide composition disclosed by Michel. Claim 66, and claims dependent thereon, do not allow the "L" element to be lanthanum when "M" is barium.

Michel in View of Bednorz

For reasons previously explained as to Bednorz and Michel as individual references, neither anticipate nor render obvious a composition by process as described in claim 66, and claims dependent thereon. For like reason, the combination of Michel in view of Bednorz does not either.

Bednorz in View of Michel and Murata

For reasons previously explained the individuals references do not singularly nor in combination render

obvious a composition by process as described in claim 66 and claims dependent thereon.

Claims 78-87: Composition by Process

Independent claims 78 and 82 claim a composition of defined empirical formula made by a solid state compaction then sintering process. Bednorz describes the production of a La-Ba-Cu-oxide by a coprecipitation-thermal decomposition procedure. Komatu describes a mixed element oxide composition prepared by a method of burning-sintering-thermal treatment. The burning and thermal treatment temperatures, respectively 1400-1900°C and 1500-1800°C, are greatly in excess of any process temperature permitted by claims 78 or 82. Bednorz suggests that process temperatures in excess of 950°C will result in the loss of superconducting properties. Also, the instant application teaches that process temperatures in excess of 1100°C tend to degrade the superconducting properties of an oxide complex. In view thereof, it is submitted that no reasonable basis exists for belief that a Komatu oxide produced by a Komatu process would have superconducting properties, and therefore Komatu neither anticipates nor renders obvious the composition by process claimed in claims 78 and 82.

As before note, Murata does not produce as a separate composition a sintered semiconductive oxide compound. Even with respect to the mixed oxide compound system which Murata does produce, it does so by a calcination-mixing-sintering procedure and not by solid compaction and sintering as set forth by claims 78 and 81

and claims dependent thereon. Similarly, Michel's La-Ba-Cu oxide composition is produced by a calcination-sintering procedure, not a solid compaction-sintering as set forth by claim 78 and 81. Hence neither Murata nor Michel, nor any combination thereof with Bednorz renders obvious the composition by process claimed by claims 78 and 82 or claims dependent thereon.

Claims 88-92: Process for Making  
Superconductive Oxide Composition

The references cited do not disclose a compaction-sintering process for the production of a superconductive oxide composition. As before noted, Bednorz discloses a coprecipitation-thermal decomposition procedure and Michel and others disclose a calcination-sintering procedure. It is respectfully submitted that claims 88-92 present patentable subject matter over any reference of record.

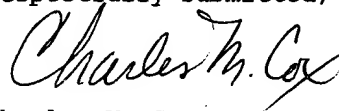
CONCLUSION

For reasons as above explained it is believed that the claims now presented are allowable over the art references cited by the Examiner in the Office Actions issued in earlier filed application Serial Nos. 2,089; 6,991 and 12,205.

To expedite the filing of this Preliminary Amendment so that the Examiner may consider the newly presented claims before acting on this application, the remarks of this communication do not address the 35 USC § 112 objection made in the earlier issued Office Actions.

Based upon the interview which occurred December 2, 1987 in Serial No. 12,205, Applicant understands that a Supplemental Office Action will issue in that case. Such 35 USC § 112 objections which remain in that case will be addressed in response to that Supplemental Office Action. To the extent that the Examiner may assert any similar objection in this application, such issues will be addressed in a response in this application following the first Office Action on this application.

Respectfully submitted,



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Dec. 4, 1987